

Atty Dkt. 2002-0039-06
USSN 10/712,688

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.-20. (canceled)

21. (original) A delivery module for delivering a laser beam utilized in a manufacturing process from the output of a gas discharge laser to the input of a manufacturing tool utilizing the laser light comprising:

at least three laser beam travel paths providing for at least two changes in direction of the travel of the laser beam;

an enclosure enclosing the beam travel paths and sealing the beam paths from the surrounding environment;

at least two optical elements effecting the at least two changes in direction of the travel of the laser beam;

at least one of the at least two optical elements is an automated optical element having an automated positioner to select the change in direction of the laser light beam effected by the automated optical element;

a delivery unit laser light inlet port receiving a laser beam output of the laser;

a delivery unit laser light outlet port discharging the laser beam to a manufacturing tool light inlet port;

a beam analysis module, located in the delivery unit close to the delivery unit light outlet port, containing measuring equipment for measuring at least one of the beam pulse energy on a pulse by pulse basis and beam pointing and beam position and for providing an output control signal to the laser and to the automated optical element.

22. (currently amended) The apparatus of claim +21 further comprising:

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a beam pulse stretcher in at least one of the beam travel paths.

23. (currently amended) The apparatus of claim 1 21, further comprising:
at least one of the at least two optical elements is a fixed optical element having an orientation mechanism operable from outside the enclosure to select the change in direction of the laser beam effected by the fixed optical element.

24. (currently amended) The apparatus of claim 2 22, further comprising:
at least one of the at least two optical elements is a fixed optical element having an orientation mechanism operable from outside the enclosure to select the change in direction of the laser beam effected by the fixed optical element.

25. (currently amended) The apparatus of claim 1 21 further comprising:
the enclosure including beam analysis equipment comprising a target and beam directors incorporated on a moveable mounting which is insertable in the laser beam path for beam diagnostic purposes and removable from the beam path during normal operation.

26. (currently amended) The apparatus of claim 2 22 further comprising:
the enclosure including beam analysis equipment comprising a target and beam directors incorporated on a moveable mounting which is insertable in the laser beam path for beam diagnostic purposes and removable from the beam path during normal operation.

27. (currently amended) The apparatus of claim 3 23 further comprising:
the enclosure including beam analysis equipment comprising a target and beam directors incorporated on a moveable mounting which is insertable in the laser beam path for beam diagnostic purposes and removable from the beam path during normal operation.

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28. (currently amended) The apparatus of claim [[4]] 24 further comprising:
the enclosure including beam analysis equipment comprising a target and beam directors incorporated on a moveable mounting which is insertable in the laser beam path for beam diagnostic purposes and removable from the beam path during normal operation.

29. (currently amended) The apparatus of claim 5 25 further comprising:
the enclosure is purged.

30. (currently amended) The apparatus of claim 6 26 further comprising:
the enclosure is purged.

31. (currently amended) The apparatus of claim 7 27 further comprising:
the enclosure is purged.

32. (currently amended) The apparatus of claim 8 28 further comprising:
the enclosure is purged.

33. (currently amended) The apparatus of claim 9 29 further comprising:
the fixed optical element is equipped with a turning wrench extending through the enclosure and sealingly engaging the enclosure such that movement of the fixed optical element can be effected without exposing the beam path inside of the enclosure to the external environment.

34. (currently amended) The apparatus of claim 10 30 further comprising:
the fixed optical element is equipped with a turning wrench extending through the enclosure and sealingly engaging the enclosure such that movement of the fixed optical element can be effected without exposing the beam path inside of the enclosure to the external

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environment.

35. (currently amended) The apparatus of claim ~~11~~ 31 further comprising:

the fixed optical element is equipped with a turning wrench extending through the enclosure and sealingly engaging the enclosure such that movement of the fixed optical element can be effected without exposing the beam path inside of the enclosure to the external environment.

36. (currently amended) The apparatus of claim ~~12~~ 32 further comprising:

the fixed optical element is equipped with a turning wrench extending through the enclosure and sealingly engaging the enclosure such that movement of the fixed optical element can be effected without exposing the beam path inside of the enclosure to the external environment.

37. (currently amended) The apparatus of claim ~~13~~ 33 further comprising:

the automated optical element is controlled in tip and tilt based upon a signal provided by the beam analysis module from the group of the beam pointing and beam position output signals of the beam analysis module.

38. (currently amended) The apparatus of claim ~~14~~ 34 further comprising:

the automated optical element is controlled in tip and tilt based upon a signal provided by the beam analysis module from the group of the beam pointing and beam position output signals of the beam analysis module.

39. (currently amended) The apparatus of claim ~~15~~ 35 further comprising:

the automated optical element is controlled in tip and tilt based upon a signal provided by the beam analysis module from the group of the beam pointing and beam position output signals

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of the beam analysis module.

40. (currently amended) The apparatus of claim 16 36 further comprising:

the automated optical element is controlled in tip and tilt based upon a signal provided by the beam analysis module from the group of the beam pointing and beam position output signals of the beam analysis module.

41. (currently amended) The apparatus of claim 17 37 further comprising:

the enclosure comprises at least two shutter elements insertable into the enclosure on either side of an optical element to maintain the seal of the enclosure on the side of the respective shutter element away from the optical element during maintenance on or replacement of the optical element.

42. (currently amended) The apparatus of claim 18 38 further comprising:

the enclosure comprises at least two shutter elements insertable into the enclosure on either side of an optical element to maintain the seal of the enclosure on the side of the respective shutter element away from the optical element during maintenance on or replacement of the optical element.

43. (currently amended) The apparatus of claim 19 39 further comprising:

the enclosure comprises at least two shutter elements insertable into the enclosure on either side of an optical element to maintain the seal of the enclosure on the side of the respective shutter element away from the optical element during maintenance on or replacement of the optical element.

44. (currently amended) The apparatus of claim 20 40 further comprising:

the enclosure comprises at least two shutter elements insertable into the enclosure on

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either side of an optical element to maintain the seal of the enclosure on the side of the respective shutter element away from the optical element during maintenance on or replacement of the optical element.

45. (currently amended) The apparatus of claim 4 21 further comprising:

a beam pulse stretcher in at least one of the three beam travel paths, the pulse stretcher comprising:

a beam splitter in the at least one of the beam travel paths passing a selected percentage $x\%$ of the laser beam along the beam travel axis of the at least one of the three beam travel paths and reflecting $(100 - x)\%$ into a beam optical delay path;

the beam optical delay returning the beam to the beam splitter as a first delayed beam;

the beam splitter reflecting $(100 - x)\%$ of the first delayed beam along the beam travel axis and passing $x\%$ of the first delayed beam into the optical delay path as a second delayed beam.

46. (currently amended) The apparatus of claim 25 45 further comprising:

the optical delay path comprising:

at least one focusing optic in the optical delay path.

47. (original) A delivery module for delivering a laser light pulse utilized in a manufacturing process from the output of a gas discharge laser to the input of a manufacturing tool utilizing the laser light comprising:

a beam delivery unit comprising a beam path enclosure structure providing a laser output light pulse beam path, from a laser beam output port located on said laser to a remote laser beam output port at a terminus of said beam delivery unit;

the beam path enclosure unit having at least one first beam transition section oriented in the direction of the output laser light pulse beam entering the at least one first beam transiting section, and at least one second beam transition section oriented in a different direction from the

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at least one first beam transition section forming a junction of the at least one first beam transition section and the at least one second beam transition section;
a first turning optic located at the junction and positioned at an angle to the output laser light pulse beam transiting the at least one first transition section, creating a first redirected laser output light pulse beam transiting the at least one second beam transition portion;
a second turning optic located at a terminus of the at least one second beam transition section and positioned to redirect the first redirected laser output light pulse beam transiting the at least one second transition section, creating a second redirected laser output light pulse beam transiting in the at least one second transition section;
at least one of the first and second turning optics is an automated turning optic having an automated positioner to select the change in direction of the laser output light pulse beam incident upon the automated turning optic;
a delivery module laser output light pulse beam inlet port receiving a laser output light pulse beam from the laser;
a delivery module laser output light pulse beam outlet port discharging the laser output light pulse beam to a manufacturing tool light inlet port;
a beam analysis module, located in the delivery module close to the delivery module outlet port, containing measuring equipment for measuring at least one of the beam pulse energy, on a pulse by pulse basis, and beam direction, and for providing an output control signal to the laser and to the automated turning optic.

48. (currently amended) The apparatus of claim 28 47, further comprising:

a beam pulse stretcher in the delivery module.